

**$f_1(1420)$**  $I^G(J^{PC}) = 0^+(1^{++})$ See the minireview under  $\eta(1405)$ .

<b><math>f_1(1420)</math> MASS</b>					
<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b><math>1426.4 \pm 0.9</math> OUR AVERAGE</b>				Error includes scale factor of 1.1.	
1434 $\pm 5$ $\pm 5$	133	1 ACHARD	07 L3	$183\text{--}209 e^+e^- \rightarrow e^+e^- K_S^0 K^\pm \pi^\mp$	NODE=M006
1426 $\pm 6$	711	ABDALLAH	03H DLPH	$91.2 e^+e^- \rightarrow K_S^0 K^\pm \pi^\mp + X$	NODE=M006M2
1420 $\pm 14$	3651	NICHITIU	02 OBLX		NODE=M006M2
1428 $\pm 4$ $\pm 2$	20k	ADAMS	01B B852	$18 \text{ GeV } \pi^- p \rightarrow K^+ K^- \pi^0 n$	
1426 $\pm 1$		BARBERIS	97C OMEG	$450 pp \rightarrow pp K_S^0 K^\pm \pi^\mp$	
1425 $\pm 8$		BERTIN	97 OBLX	$0.0 \bar{p}p \rightarrow K^\pm(K^0) \pi^\mp \pi^+ \pi^-$	
1435 $\pm 9$		PROKOSHKIN	97B GAM4	$100 \pi^- p \rightarrow \eta \pi^0 \pi^0 n$	
1430 $\pm 4$		2 ARMSTRONG	92E OMEG	$85,300 \pi^+ p, pp \rightarrow \pi^+ p, pp(K\bar{K}\pi)$	
1462 $\pm 20$		3 AUGUSTIN	92 DM2	$J/\psi \rightarrow \gamma K\bar{K}\pi$	
1443 $^{+7}_{-6}$ $^{+3}_{-2}$	1100	BAI	90C MRK3	$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$	
1425 $\pm 10$	17	BEHREND	89 CELL	$\gamma\gamma \rightarrow K_S^0 K^\pm \pi^\mp$	
1442 $\pm 5$ $^{+10}_{-17}$	111	BECKER	87 MRK3	$e^+e^-, \omega K\bar{K}\pi$	
1423 $\pm 4$		GIDAL	87B MRK2	$e^+e^- \rightarrow e^+e^- K\bar{K}\pi$	
1417 $\pm 13$	13	AIHARA	86C TPC	$e^+e^- \rightarrow e^+e^- K\bar{K}\pi$	
1422 $\pm 3$		CHAUVAT	84 SPEC	ISR 31.5 $pp$	
1440 $\pm 10$		4 BROMBERG	80 SPEC	$100 \pi^- p \rightarrow K\bar{K}\pi X$	
1426 $\pm 6$	221	DIONISI	80 HBC	$4 \pi^- p \rightarrow K\bar{K}\pi n$	
1420 $\pm 20$		DAHL	67 HBC	$1.6\text{--}4.2 \pi^- p$	
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>					
1430.8 $\pm 0.9$		5 SOSA	99 SPEC	$pp \rightarrow p_{\text{slow}} (K_S^0 K^+ \pi^-) p_{\text{fast}}$	
1433.4 $\pm 0.8$		5 SOSA	99 SPEC	$pp \rightarrow p_{\text{slow}} (K_S^0 K^- \pi^+) p_{\text{fast}}$	OCCUR=2
1429 $\pm 3$	389	ARMSTRONG	89 OMEG	$300 pp \rightarrow K\bar{K}\pi pp$	
1425 $\pm 2$	1520	ARMSTRONG	84 OMEG	$85 \pi^+ p, pp \rightarrow (\pi^+, p)(K\bar{K}\pi)p$	
$\sim 1420$		BITYUKOV	84 SPEC	$32 K^- p \rightarrow K^+ K^- \pi^0 Y$	

<sup>1</sup> From a fit with a width fixed at 55 MeV.<sup>2</sup> This result supersedes ARMSTRONG 84, ARMSTRONG 89.<sup>3</sup> From fit to the  $K^*(892)K 1^{++}$  partial wave.<sup>4</sup> Mass error increased to account for  $a_0(980)$  mass cut uncertainties.<sup>5</sup> No systematic error given.

<b><math>f_1(1420)</math> WIDTH</b>					
<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b><math>54.9 \pm 2.6</math> OUR AVERAGE</b>					
51 $\pm 14$	711	ABDALLAH	03H DLPH	$91.2 e^+e^- \rightarrow K_S^0 K^\pm \pi^\mp + X$	NODE=M006
61 $\pm 8$	3651	NICHITIU	02 OBLX		NODE=M006W
38 $\pm 9$ $\pm 6$	20k	ADAMS	01B B852	$18 \text{ GeV } \pi^- p \rightarrow K^+ K^- \pi^0 n$	NODE=M006W
58 $\pm 4$		BARBERIS	97C OMEG	$450 pp \rightarrow pp K_S^0 K^\pm \pi^\mp$	
45 $\pm 10$		BERTIN	97 OBLX	$0.0 \bar{p}p \rightarrow K^\pm(K^0) \pi^\mp \pi^+ \pi^-$	
90 $\pm 25$		PROKOSHKIN	97B GAM4	$100 \pi^- p \rightarrow \eta \pi^0 \pi^0 n$	
58 $\pm 10$		6 ARMSTRONG	92E OMEG	$85,300 \pi^+ p, pp \rightarrow \pi^+ p, pp(K\bar{K}\pi)$	

129	$\pm 41$		7 AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\bar{K}\pi$
68	$+29$	$+8$	-18	1100	BAI	90C MRK3 $J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
42	$\pm 22$			17	BEHREND	89 CELL $\gamma\gamma \rightarrow K_S^0 K^\pm \pi^\mp$
40	$+17$	$\pm 5$		111	BECKER	87 MRK3 $e^+ e^- \rightarrow \omega K\bar{K}\pi$
35	$+47$		-20	13	AIHARA	86C TPC $e^+ e^- \rightarrow e^+ e^- K\bar{K}\pi$
47	$\pm 10$				CHAUVAT	84 SPEC ISR 31.5 $pp$
62	$\pm 14$				BROMBERG	80 SPEC $100 \pi^- p \rightarrow K\bar{K}\pi X$
40	$\pm 15$			221	DIONISI	80 HBC $4 \pi^- p \rightarrow K\bar{K}\pi n$
60	$\pm 20$				DAHL	67 HBC $1.6-4.2 \pi^- p$
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>						
68.7 $\pm$ 2.9				8 SOSA	99 SPEC	$pp \rightarrow p_{slow}$ $(K_S^0 K^\pm \pi^\mp) p_{fast}$
58.8 $\pm$ 3.3				8 SOSA	99 SPEC	$pp \rightarrow p_{slow}$ $(K_S^0 K^\pm \pi^\mp) p_{fast}$
58 $\pm$ 8		389		ARMSTRONG	89 OMEG	$300 pp \rightarrow K\bar{K}\pi pp$
62 $\pm$ 5		1520		ARMSTRONG	84 OMEG	$85 \pi^+ p, pp \rightarrow (\pi^+, p)(K\bar{K}\pi)p$
$\sim 50$				BITYUKOV	84 SPEC	$32 K^- p \rightarrow K^+ K^- \pi^0 Y$

6 This result supersedes ARMSTRONG 84, ARMSTRONG 89.

7 From fit to the  $K^*(892)K^- 1^{++}$  partial wave.

8 No systematic error given.

OCCUR=2

NODE=M006W;LINKAGE=C  
NODE=M006W;LINKAGE=B  
NODE=M006W;LINKAGE=N1

NODE=M006215;NODE=M006

## f<sub>1</sub>(1420) DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $K\bar{K}\pi$	dominant
$\Gamma_2$ $K\bar{K}^*(892) + c.c.$	dominant
$\Gamma_3$ $\eta\pi\pi$	possibly seen
$\Gamma_4$ $a_0(980)\pi$	
$\Gamma_5$ $\pi\pi\rho$	
$\Gamma_6$ $4\pi$	
$\Gamma_7$ $\rho^0\gamma$	
$\Gamma_8$ $\phi\gamma$	seen

## f<sub>1</sub>(1420) $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(K\bar{K}\pi) \times \Gamma(\gamma\gamma^*)/\Gamma_{\text{total}}$	VALUE (keV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1.9 <math>\pm</math> 0.4 OUR AVERAGE</b>						
3.2 $\pm$ 0.6 $\pm$ 0.7		133	9,10	ACHARD	07 L3	$183-209 e^+ e^- \rightarrow e^+ e^- K_S^0 K^\pm \pi^\mp$
3.0 $\pm$ 0.9 $\pm$ 0.7			11,12	BEHREND	89 CELL	$e^+ e^- \rightarrow e^+ e^- K_S^0 K^\pm$
$2.3^{+1.0}_{-0.9} \pm 0.8$				HILL	89 JADE	$e^+ e^- \rightarrow e^+ e^- K^\pm K_S^0 \pi^\mp$
1.3 $\pm$ 0.5 $\pm$ 0.3				AIHARA	88B TPC	$e^+ e^- \rightarrow e^+ e^- K^\pm K_S^0 \pi^\mp$
1.6 $\pm$ 0.7 $\pm$ 0.3			11,13	GIDAL	87B MRK2	$e^+ e^- \rightarrow e^+ e^- K\bar{K}\pi$
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>						
<8.0		95		JENNI	83 MRK2	$e^+ e^- \rightarrow e^+ e^- K\bar{K}\pi$

9 From a fit with a width fixed at 55 MeV.

10 The form factor parameter from the fit is  $926 \pm 78$  MeV.

11 Assume a  $\rho$ -pole form factor.

12 A  $\phi$ -pole form factor gives considerably smaller widths.

13 Published value divided by 2.

DESIG=2;OUR EST; $\rightarrow$  UNCHECKED  $\leftarrow$   
DESIG=1;OUR EST; $\rightarrow$  UNCHECKED  $\leftarrow$   
DESIG=5;OUR EST; $\rightarrow$  UNCHECKED  $\leftarrow$   
DESIG=4  
DESIG=3  
DESIG=6  
DESIG=8  
DESIG=9;OUR EST; $\rightarrow$  UNCHECKED  $\leftarrow$

NODE=M006220

NODE=M006G2  
NODE=M006G2

NODE=M006G2;LINKAGE=CH  
NODE=M006G2;LINKAGE=CR  
NODE=M006G2;LINKAGE=A  
NODE=M006G2;LINKAGE=D  
NODE=M006G2;LINKAGE=B

NODE=M006225

NODE=M006R1  
NODE=M006R1

## f<sub>1</sub>(1420) BRANCHING RATIOS

$\Gamma(K\bar{K}^*(892)+c.c.)/\Gamma(K\bar{K}\pi)$	VALUE	DOCUMENT ID	TECN	COMMENT	$\Gamma_2/\Gamma_1$
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>					
0.76 $\pm$ 0.06		BROMBERG	80	SPEC	$100 \pi^- p \rightarrow K\bar{K}\pi X$
0.86 $\pm$ 0.12		DIONISI	80	HBC	$4 \pi^- p \rightarrow K\bar{K}\pi n$

$\Gamma(\pi\pi\rho)/\Gamma(K\bar{K}\pi)$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_5/\Gamma_1$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
<0.3	95	CORDEN	78	OMEG 12–15 $\pi^- p$	NODE=M006R2
<2.0		DAHL	67	HBC 1.6–4.2 $\pi^- p$	NODE=M006R2

 $\Gamma(\eta\pi\pi)/\Gamma(K\bar{K}\pi)$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_3/\Gamma_1$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
<0.1	95	ARMSTRONG	91B	OMEG 300 $p p \rightarrow p p \eta \pi^+ \pi^-$	NODE=M006R3
1.35±0.75		KOPKE	89	MRK3 $J/\psi \rightarrow \omega \eta \pi \pi (K\bar{K}\pi)$	NODE=M006R3
<0.6	90	GIDAL	87	MRK2 $e^+ e^- \rightarrow e^+ e^- \eta \pi^+ \pi^-$	
<0.5	95	CORDEN	78	OMEG 12–15 $\pi^- p$	
1.5 ± 0.8		DEFOIX	72	HBC 0.7 $\bar{p} p \rightarrow 7\pi$	

 $\Gamma(a_0(980)\pi)/\Gamma(\eta\pi\pi)$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_4/\Gamma_3$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
>0.1	90	PROKOSHKIN	97B	GAM4 100 $\pi^- p \rightarrow \eta \pi^0 \pi^0 n$	NODE=M006R4
not seen in either mode		ANDO	86	SPEC 8 $\pi^- p$	NODE=M006R4
not seen in either mode		CORDEN	78	OMEG 12–15 $\pi^- p$	
0.4±0.2		DEFOIX	72	HBC 0.7 $\bar{p} p \rightarrow 7\pi$	

 $\Gamma(4\pi)/\Gamma(K\bar{K}^*(892)+c.c.)$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_6/\Gamma_2$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
<0.90	95	DIONISI	80	HBC 4 $\pi^- p$	NODE=M006R5

 $\Gamma(K\bar{K}\pi)/[\Gamma(K\bar{K}^*(892)+c.c.) + \Gamma(a_0(980)\pi)]$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_1/(\Gamma_2+\Gamma_4)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
0.65±0.27	<sup>14</sup> DIONISI	80	HBC 4 $\pi^- p$	NODE=M006R6

<sup>14</sup> Calculated using  $\Gamma(K\bar{K})/\Gamma(\eta\pi) = 0.24 \pm 0.07$  for  $a_0(980)$  fractions.

 $\Gamma(a_0(980)\pi)/\Gamma(K\bar{K}^*(892)+c.c.)$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_4/\Gamma_2$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
0.04±0.01±0.01		BARBERIS	98C	OMEG 450 $p p \rightarrow p_f f_1(1420) p_s$	NODE=M006R7

$\bullet \bullet \bullet$  We do not use the following data for averages, fits, limits, etc.  $\bullet \bullet \bullet$

<0.04 68 ARMSTRONG 84 OMEG 85  $\pi^+ p$

 $\Gamma(4\pi)/\Gamma(K\bar{K}\pi)$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_6/\Gamma_1$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
<0.62	95	ARMSTRONG	89G	OMEG 85 $\pi p \rightarrow 4\pi X$	NODE=M006R8

 $\Gamma(\rho^0\gamma)/\Gamma_{\text{total}}$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_7/\Gamma$
$\bullet \bullet \bullet$ Using the data on the $\bar{K} K \pi$ mode from ARMSTRONG 89.					
<0.08	95	<sup>15</sup> ARMSTRONG	92C	SPEC 300 $p p \rightarrow p p \pi^+ \pi^- \gamma$	NODE=M006R9

15 Using the data on the  $\bar{K} K \pi$  mode from ARMSTRONG 89.

 $\Gamma(\rho^0\gamma)/\Gamma(K\bar{K}\pi)$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_7/\Gamma_1$
$\bullet \bullet \bullet$ Using the data on the $\bar{K} K \pi$ mode from ARMSTRONG 89.					
<0.02	95	BARBERIS	98C	OMEG 450 $p p \rightarrow p_f f_1(1420) p_s$	NODE=M006R10

 $\Gamma(\phi\gamma)/\Gamma(K\bar{K}\pi)$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_8/\Gamma_1$
$\bullet \bullet \bullet$ Using the data on the $\bar{K} K \pi$ mode from ARMSTRONG 89.				
0.003±0.001±0.001	BARBERIS	98C	OMEG 450 $p p \rightarrow p_f f_1(1420) p_s$	NODE=M006R11

**f<sub>1</sub>(1420) REFERENCES**

NODE=M006

ACHARD	07	JHEP 0703 018	P. Achard <i>et al.</i>	(L3 Collab.)	REFID=51698
ABDALLAH	03H	PL B569 129	J. Abdallah <i>et al.</i>	(DELPHI Collab.)	REFID=49548
NICHITIU	02	PL B545 261	F. Nichitiu <i>et al.</i>	(OBELIX Collab.)	REFID=48848
ADAMS	01B	PL B516 264	G.S. Adams <i>et al.</i>	(BNL E852 Collab.)	REFID=49649
SOSA	99	PRL 83 913	M. Sosa <i>et al.</i>		REFID=46937
BARBERIS	98C	PL B440 225	D. Barberis <i>et al.</i>	(WA 102 Collab.)	REFID=46346
BARBERIS	97C	PL B413 225	D. Barberis <i>et al.</i>	(WA 102 Collab.)	REFID=45759
BERTIN	97	PL B400 226	A. Bertin <i>et al.</i>	(OBELIX Collab.)	REFID=45417
PROKOSHKIN	97B	SPD 42 298	Yu.D. Prokoshkin, S.A. Sadovsky		REFID=45549
Translated from DANS 354 751.					
ARMSTRONG	92C	ZPHY C54 371	T.A. Armstrong <i>et al.</i>	(ATHU, BARI, BIRM+)	REFID=42097
ARMSTRONG	92E	ZPHY C56 29	T.A. Armstrong <i>et al.</i>	(ATHU, BARI, BIRM+) JPC	REFID=43173
AUGUSTIN	92	PR D46 1951	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41584
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong <i>et al.</i>	(ATHU, BARI, BIRM+)	REFID=41862
BAI	90C	PRL 65 2507	Z. Bai <i>et al.</i>	(Mark III Collab.)	REFID=41578
ARMSTRONG	89	PL B221 216	T.A. Armstrong <i>et al.</i>	(CERN, CDEF, BIRM+) JPC	REFID=40729
ARMSTRONG	89G	ZPHY C43 55	T.A. Armstrong <i>et al.</i>	(CERN, BIRM, BARI+)	REFID=40930
BEHREND	89	ZPHY C42 367	H.J. Behrend <i>et al.</i>	(CELLO Collab.)	REFID=40732
HILL	89	ZPHY C42 355	P. Hill <i>et al.</i>	(JADE Collab.) JP	REFID=40741
KOPKE	89	PRPL 174 67	L. Kopke <i>et al.</i>	(CERN)	REFID=41863
AIHARA	88B	PL B209 107	H. Aihara <i>et al.</i>	(TPC-2 $\gamma$ Collab.)	REFID=40572
BECKER	87	PRL 59 186	J.J. Becker <i>et al.</i>	(Mark III Collab.) JP	REFID=40015
GIDAL	87	PRL 59 2012	G. Gidal <i>et al.</i>	(LBL, SLAC, HARV)	REFID=40223
GIDAL	87B	PRL 59 2016	G. Gidal <i>et al.</i>	(LBL, SLAC, HARV)	REFID=40224
AIHARA	86C	PRL 57 2500	H. Aihara <i>et al.</i>	(TPC-2 $\gamma$ Collab.) JP	REFID=21326
ANDO	86	PRL 57 1296	A. Ando <i>et al.</i>	(KEK, KYOT, NIIRS, SAGA+)	REFID=20891
ARMSTRONG	84	PL 146B 273	T.A. Armstrong <i>et al.</i>	(ATHU, BARI, BIRM+) JP	REFID=20929
BITYUKOV	84	SJNP 39 735	S. Bityukov <i>et al.</i>	(SERP)	REFID=45856
Translated from YAF 39 1165.					
CHAUVAT	84	PL 148B 382	P. Chauvat <i>et al.</i>	(CERN, CLER, UCLA+)	REFID=20932
JENNI	83	PR D27 1031	P. Jenni <i>et al.</i>	(SLAC, LBL)	REFID=20304
BROMBERG	80	PR D22 1513	C.M. Bromberg <i>et al.</i>	(CIT, FNAL, ILLC+)	REFID=20922
DIONISI	80	NP B169 1	C. Dionisi <i>et al.</i>	(CERN, MADR, CDEF+) IJP	REFID=20924
CORDEN	78	NP B144 253	M.J. Corden <i>et al.</i>	(BIRM, RHET, TELA+)	REFID=20452
DEFOIX	72	NP B44 125	C. Defoix <i>et al.</i>	(CDEF, CERN)	REFID=20435
DAHL	67	PR 163 1377	O.I. Dahl <i>et al.</i>	(LRL, UCB) IJP	REFID=20321
Also		PRL 14 1074	D.H. Miller <i>et al.</i>	(LRL, UCB)	REFID=21291